

IN THE CLAIMS

1. (currently amended) A method for Optimizing Pre-saturation in a scan volume of an MRI system, comprising:

a. creating a B_0 magnetic field;

a. creating b. creating a B_0 map for each slice of the of a scan volume from the B_0 magnetic field, each scan slice having a plurality of positive and negative scan slice pixels;

b. obtaining c. obtaining a first frequency for RF pre-pulses of RF pre-pulses for each scan slice;

c. calculating d. calculating a median value for the of the B_0 magnetic field from the B_0 map for each scan slice;

d. calculating the percentage e. calculating percentages of the positive and negative scan slice pixels in each scan slice

2. (currently amended) A method for generating an image of a scan volume using an MRI system, the method comprising the steps of:

a. generating a B_0 field map of each scan slice of the of a scan volume by measuring a B_0 magnetic field distribution over each scan slice of the scan volume, each scan slice having a plurality of positive and negative scan slice pixels;

b. obtaining a first frequency of RF pre-pulses;

c. calculating a median value of the B_0 magnetic field over each scan slice, the calculation being done using the B_0 field maps;

d. calculating the percentage percentages of the positive and negative scan slice pixels in each scan slice, the calculation being done using the $B_{sub.0}B_0$ field map for each scan slice, wherein a positive scan slice pixel is defined as a scan slice pixel with positive value in the $B_{sub.0}B_0$ field map, and wherein a negative scan slice pixel is defined as a scan slice pixel with negative value in the $B_{sub.0}B_0$ field map;

e. ~~if the~~ wherein when the percentage of either the positive scan slice pixels or the negative scan slice pixels in each scan slice is greater than a predefined threshold value, performing the step of:

i. calculating a second frequency of RF pre-pulses for each scan slice by correcting the first frequency of RF pre-pulses, the correction for a scan slice being done by using the median value of the $B_{sub.0}B_0$ magnetic field over the scan slice calculated at step c;

~~else performing the steps of otherwise performing:~~

ii. ~~improving the shimming~~ shimming of the B_0 magnetic field; and

iii. repeating steps a through e; and

f. obtaining an MRI image of each scan slice, wherein the MRI image of a scan slice is obtained using RF pre-pulses at the second frequency for the scan slice.

3. (currently amended) The method of ~~claim 1-claim 2~~ wherein the step of calculating a second frequency of RF pre-pulses for a scan slice is done by adding the median value of the $B_{sub.0}B_0$ magnetic field over the scan slice to the first frequency of RF pre-pulses.

4. (currently amended) The method of claim 1 ~~wherein the~~ further comprising applying a plurality of RF pre-pulses are used to suppress magnetic resonance signals from hydrogen nuclei in fat molecules present in the scan volume.

5. (currently amended) The method of claim 1 ~~wherein the~~ further comprising applying a plurality of RF pre-pulses are used to suppress magnetic resonance signals from hydrogen nuclei in macromolecules present in the scan volume.

6. (currently amended) The method of claim 1 ~~wherein the~~ further comprising applying a plurality of RF pre-pulses are used to suppress magnetic resonance signals from hydrogen nuclei in water molecules present in the scan volume.

7. (currently amended) The method of ~~claim 1~~claim 2 wherein the step of obtaining an MRI image of a scan slice comprises the steps of:

- a. applying
 - i. ~~RE pre-pulses~~RF pre-pulses at second frequency for the scan slice; and
 - ii. ~~RE pulses~~RF pulses at transmit frequency to the scan slice;
- b. measuring magnetic resonance signals from the scan slice; and
- c. processing the magnetic resonance signals to obtain an MRI image of the scan slice.

8. (currently amended) A method ~~for generating an image of a scan volume using an MRI system, the method comprising the steps of:~~

- a. generating a $B_{sub.0}B_0$ field map of each scan slice ~~of the~~of a scan volume by measuring ~~$B_{sub.0}a$~~ B_0 magnetic field ~~distribution~~ over each scan slice of the scan volume and storing the $B_{sub.0}B_0$ field map in a database, each scan slice having a plurality of positive and negative scan slice pixels;
- b. obtaining a first frequency of RF pre-pulses for each scan slice;
- c. calculating median value of the $B_{sub.0}B_0$ magnetic field over each scan slice, the calculation being done using the $B_{sub.0}B_0$ field maps stored in the database;
- d. calculating the percentagepercentages of the positive and negative scan slice pixels in each scan slice, the calculation being done using the $B_{sub.0}B_0$ field map for each scan slice, wherein a positive scan slice pixel is defined as a scan slice pixel with positive value in the $B_{sub.0}B_0$ field map, and wherein a negative scan slice pixel is defined as a scan slice pixel with negative value in the $B_{sub.0}B_0$ field map;
- e. if thewherein when the percentage of either the positive scan slice pixels or the negative scan slice pixels in each scan slice is greater than a predefined threshold value, performing the step of:

i. calculating a second frequency of RF pre-pulses for each scan slice by correcting the first frequency of RF pre-pulses, the correction for a scan slice being done by adding the median value of the $B_{\text{sub-0}}B_0$ magnetic field over the scan slice calculated at step c to the first frequency of RF pre-pulses calculated at step b;

~~else performing the steps e~~ otherwise performing:

ii. ~~improving the shimming~~ shimming of the B_0 magnetic field;

and

iii. repeating steps a through e;

f. obtaining an MRI image of each scan slice using RF pre-pulses at second frequency for that scan slice;

g. storing the MRI image of each scan slice obtained at step f in the database; and

h. displaying the MRI images stored in the database on a display device.

9. (currently amended) The method of ~~claim 7~~claim 8 wherein the RF pre-pulses are used to suppress magnetic resonance signals from hydrogen nuclei in fat molecules present in the scan volume.

10. (currently amended) The method of ~~claim 7~~claim 8 wherein the step of obtaining an MRI image of a scan slice comprises the steps of:

a. applying

i. RF pre-pulses at second frequency for the scan slice; and

ii. ~~RF pulses~~ RF pulses at transmit frequency to the scan slice;

b. measuring magnetic resonance signals from the scan slice; and

c. processing the magnetic resonance signals to obtain an MRI image of the scan slice.

11. (currently amended) An MRI system comprising:

- a. a polarizing magnet for producing configured to produce a high intensity magnetic field called $B_{\text{sub.0}}$ B_0 magnetic field;
- b. a set of shimming coils for improving $B_{\text{sub.0}}$ configured to improve homogeneity of the B_0 magnetic field homogeneity;field;
- c. a magnetic field detector for measuring $B_{\text{sub.0}}$ configured to measure a B_0 magnetic field distribution from the B_0 magnetic field;
- d. a set of gradient coils for producing configured to produce a gradient magnetic field superposed on the $B_{\text{sub.0}}$ B_0 magnetic field;
- e. a transmitter for generating configured to generate RF pulses and RF pre-pulses wherein frequency of RF pre-pulses is specific for each scan slice, each scan slice having a plurality of positive and negative scan slice pixels;
- f. a radio frequency receiver for detecting configured to detect magnetic resonance signals;
- g. a processing module comprising:
 - i. a module for calculating configured to calculate the median of the $B_{\text{sub.0}}$ B_0 magnetic field over each scan slice;
 - ii. a module for calculating the percentage configured to calculate percentages of the positive and negative scan slice pixels in each scan slice, wherein positive scan slice pixels are defined as scan slice pixels with positive $B_{\text{sub.0}}$ B_0 magnetic field values, and wherein negative scan slice pixels are defined as scan slice pixels with negative $B_{\text{sub.0}}$ B_0 magnetic field values;
 - iii. a module for calculating configured to calculate a second frequency of RF pre-pulses for each scan slice by adding the median value of the $B_{\text{sub.0}}$ B_0 magnetic field over the scan slice to a first frequency of RF pre-pulses, the first frequency of RF pre-pulses being obtained by a standard procedure; and

iv. a module for processing configured to process magnetic resonance signals from a scan slice to obtain an MRI image of the scan slice pulses for each scan slice; and

- h. a database comprising:
 - i. a storage unit for storing $B_{sub.0}$ configured to store B_0 field maps;
 - ii. a second storage unit for storing configured to store the median value of the $B_{sub.0}B_0$ magnetic field over each scan slice; and
 - iii. a third storage unit for storing configured to store an MRI image of each scan slice.

12. (currently amended) A computer program product for use with a computer, the computer program product comprising a computer usable medium having a computer readable program code embodied therein for generating an image using an MRI system, the computer program code performing the steps of:

- a. generating a $B_{sub.0}B_0$ field map of each scan slice of the scan volume by measuring $B_{sub.0}a B_0$ magnetic field distribution over each scan slice of the scan volume, each scan slice having a plurality of positive and negative scan slice pixels;
- b. obtaining a first frequency of RF pre-pulses;
- c. calculating median value of the $B_{sub.0}B_0$ magnetic field over each scan slice, the calculation being done using the $B_{sub.0}B_0$ field maps;
- d. calculating the percentage of the positive and negative scan slice pixels in each scan slice, the calculation being done using the $B_{sub.0}B_0$ field map for each scan slice, wherein a positive scan slice pixel is defined as a scan slice pixel with positive value in the $B_{sub.0}B_0$ field map, and wherein a negative scan slice pixel is defined as a scan slice pixel with negative value in the $B_{sub.0}B_0$ field map;

e. ~~if the~~ wherein when the percentage of either the positive scan slice pixels or the negative scan slice pixels in each scan slice is greater than a predefined threshold value, performing the step of:

i. calculating a second frequency of RF pre-pulses for each scan slice by correcting the first frequency of RF pre-pulses, the correction for a scan slice being done by adding the median value of the $B_{sub.0}B_0$ magnetic field over the scan slice ~~to~~ the first frequency of RF pre-pulses;

~~else performing the steps of otherwise performing:~~

ii. ~~improving the shimming~~ shimming of the B_0 magnetic field;

and

iii. repeating steps a through e; and

f. obtaining an MRI image of each scan slice, wherein the MRI image of a scan slice is obtained using RF pre-pulses at the second frequency for the scan slice.

13. (currently amended) A computer program product for use with a computer, the computer program product comprising a computer usable medium having a computer readable program code embodied therein for acquiring an image using an MRI system, the computer program code performing the steps of:

a. generating a $B_{sub.0}B_0$ field map of each scan slice ~~of the~~ of a scan volume by measuring $B_{sub.0}aB_0$ magnetic field ~~distribution~~ over each scan slice of the scan volume and storing the $B_{sub.0}B_0$ map in a database, each scan slice having a plurality of positive and negative scan slice pixels;

b. obtaining a first frequency of RF pre-pulses for each scan slice;

c. calculating median value of the $B_{sub.0}B_0$ magnetic field over each scan slice, the calculation being done using the $B_{sub.0}B_0$ field maps stored in the database;

d. calculating the percentage percentages of the positive and negative scan slice pixels in each scan slice, the calculation being done using the $B_{sub.0}B_0$ field

map for each scan slice, wherein a positive scan slice pixel is defined as a scan slice pixel with positive value in the $B_{\text{sub}}.0B_0$ field map, and wherein a negative scan slice pixel is defined as a scan slice pixel with negative value in the $B_{\text{sub}}.0B_0$ field map;

e. ~~if the~~ wherein when the percentage of either the positive scan slice pixels or the negative scan slice pixels in each scan slice is greater than a predefined threshold value, performing the step of:

i. calculating a second frequency of RF pre-pulses for each scan slice by correcting the first frequency of RF pre-pulses, the correction for a scan slice being done by adding the median value of the $B_{\text{sub}}.0B_0$ magnetic field over the scan slice to the first frequency of RF pre-pulses;

~~else performing the steps of~~ otherwise performing:

ii. ~~improving the shimming~~ shimming of the B_0 magnetic field; and ~~in repeating~~ repeating steps a through e;

f. obtaining an MRI image of each scan slice using RF pre-pulses at second frequency for that scan slice calculated at step e;

g. storing the MRI image of each scan slice obtained at step f in the database; and

h. displaying the MRI images stored in the database on a display device.